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Washington, DC 20231

Sir:

Enclosed herewith for filing is the patent application of Leandre Adifon, Richard N. Fargo, Thomas E. Landry, James A. Rivera, Bruce St. Pierre, Bruce P. Swaybill

Title: ELEVATOR STRUCTURE MOUNTING SYSTEM HAVING HORIZONTAL MEMBER FOR REDUCING BUILDING LOADS AT TOP OF HOISTWAY

Enclosed is/are 2 sheets of [X] informal [ ] formal drawings.

CLAIMS AS FILED				
FOR	NUMBER FILED	NUMBER EXTRA	RATE	BASIC FEE $690.00
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ELEVATOR STRUCTURE MOUNTING SYSTEM HAVING HORIZONTAL COMPRESSION MEMBER FOR REDUCING BUILDING LOADS AT TOP OF HOISTWAY

TECHNICAL FIELD

The present invention relates to elevators and, more specifically, to an elevator system structural support for providing reaction forces to bolt tension and moment forces associated with elevator components attached to a building structure.

BACKGROUND OF THE INVENTION

Traditional elevator systems have machine rooms located overhead in the elevator hoistway or shaft for housing the lifting motor, drive system and various other components. The terminal ends of elevator ropes that attach overhead are typically located in the machine room. Typical machine rooms provide ample space for elevator rope termination hitches having configurations capable of supporting substantial vertical loads.

Elevator systems of the type having no machine room are limited in overhead space. Thus, machine and rope terminations located at the top of the hoistway must be designed to fit within a relatively confined area while providing support for substantial vertical loads. Such vertical loads are supported by the elevator rails or similar structures. The resultant vertical load is concentrated toward the inside of the hoistway, generally coincident with the centers of mass of the elevator car and counterweight. The resultant vertical load, therefore, causes a moment force applied to the support structures. The moment is typically reacted through tensile loading of brackets, and bolts attaching the brackets to the hoistway walls, near the top of the hoistway. Such tensile loading requires significant hoistway wall strength, thereby increasing building cost.

OBJECTS AND SUMMARY OF THE INVENTION

It is an object of the invention, therefore, to provide an elevator system having structural means to alleviate or eliminate moment loads or tensile loads resulting from the same in elevator structure connections to building structures.

It is a further object of the present invention to provide an elevator system that reduces building cost requirements by minimizing moment and tensile loads resulting from elevator structure connections.

These objects and others are achieved by the present invention elevator system.

The present invention is directed to a structural system for elevator assemblies including a horizontal compression member positioned near the top of the hoistway for reacting to inwardly directed tension loads and moment forces applied to the hoistway wall and connection components resulting from the elevator vertical load. The horizontal compression member comprises a member positioned in a compression state between mounting structures for elevator ropes and elevator machine components such that the compression member reacts and counters inwardly directed horizontal forces and resultant moment forces caused by a centralized, downward vertical load.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a partial, schematic view of an elevator system having a compression member according to a preferred embodiment of the present invention.

Fig. 2 is a partial, schematic side view of an elevator system according to Fig. 1.

DESCRIPTION OF THE PREFERRED EMBODIMENT

An elevator system (10) illustrating a horizontal compression member (12) according to the present invention is shown in Fig.1. The elevator system (10) includes an elevator hoistway (14) having four walls, one of which is shown cut-away in Fig. 1. A set of elevator

mounting brackets (16, 18) are provided as mounting means for mounting the elevator assembly components to the inside walls of the hoistway (14). The elevator assembly includes the elevator machine (22), various sheaves (24), the elevator car (26) suspended by ropes (30), and rails (20). Vertically aligned elevator rails (20) run along the inside hoistway walls and may be positioned to support some or most of the vertical load resulting from the elevator assembly. Bolts (28) are utilized to fix the brackets (16, 18) to the inside hoistway walls. Under normal conditions, the bolts (28) are subject to tension loading, as the resultant vertical load of the elevator assembly is directed downwardly and is concentrated in the approximate center of the hoistway, thereby resulting in moment forces at the vertical support points at the inside hoistway walls. The tension loading is also transmitted from the bolts (28) through the brackets (16, 18) to the point at which the vertically-loaded elements are attached to the brackets (16, 18).

The compression member (12) according to the present invention is provided in such a manner so as to be compressed in between the vertical load bearing structures, such as the brackets (16, 18), elevator rails (20), or similar structures that suspend the vertical load. By spanning the horizontal distance between the brackets (16, 18) the compression member (12) counters the inwardly-directed tension loads in the bolts (28) that result from the moment caused by the elevator assembly vertical load.

The compression member (12) may be rigid as illustrated in FIG. 1. However, it will be clear to one skilled in the art that the compression member (12) may also be complaint. For example, a spring loaded telescoping beam, pre-loaded near or above the tension loads may also be used.

Referring to Fig. 2, the compression member (12) is illustrated as spanning, in compression, the horizontal distance between the brackets (16, 18) which support rope hitch ends (34) and the counterweight (32) and the elevator car (26). The compression member (12) may similarly be positioned between elevator machine mounting hardware or other structures, such as the elevator rails (20). The resultant vertical load of the elevator system (10), represented by the vector arrow (36) causes resultant moment forces represented by the vector arrows (38, 40) that

are countered by the compression forces (42, 44) of the compression member (12). The resultant tension forces (46, 48) transmitted through the bolts (28) are also countered by the compression forces (42, 44).

The compression member (12) may be made from any suitable material that provides sufficient compression strength and durability, such as structural steel.

It is possible to position one or more compression members of the type described herein according to the present invention in different locations from that specifically presented herein in the preferred embodiment, while effectively countering resultant tension and moment forces caused by vertical loads. For example, in machineroom-less elevator systems, the vertical loads of the elevator machine (22) and other equipment, e.g., controllers and dead end hitches for an elevator car, are often supported by brackets attached to the elevator guide rails (20). The guide rails (20) pass the vertical loads down through the building to the pit. In this configuration, there are minimal attachments to the walls, and the moment loads are concentrated on the guide rails (20). Therefore, in this exemplary embodiment, the optimal location for the horizontal compression member (12) is between the guide rails (20) themselves.

While the preferred embodiment of the present invention has been herein disclosed and described, modification and variation may be made without departing from the scope of the presently claimed invention.

CLAIMS

WHAT IS CLAIMED IS:

1. An elevator system comprising

an elevator assembly suspended by elevator ropes having ends suspended with respect to a rigid structure; and

a compression member positioned with respect to said rigid structure in such a manner so as to counter resultant forces applied to said rigid structure due to a vertical load.

2. An elevator system according to claim 1, wherein

said resultant forces include moment forces and inwardly-directed, generally horizontal tension forces.

3. An elevator system according to claim 1, wherein

said compression member is generally horizontally aligned.

4. An elevator system according to claim 1, further comprising

mounting brackets for attaching said elevator assembly to said rigid structure.

5. An elevator system according to claim 4, wherein

said compression member is positioned between said mounting brackets.

6. An elevator system according to claim 5, wherein

said mounting brackets are positioned on opposite sides of said elevator assembly.

7. An elevator system according to claim 4, wherein

said elevator rope ends are suspended by said mounting brackets.

8. An elevator system according to claim 1, wherein said compression member comprises a rigid compression member.

9. An elevator system according to claim 1, wherein said vertical load is attributable to said elevator car.

10. An elevator system according to claim 1, wherein said elevator assembly further comprises a pair of elevator guide rails having said compression member located therebetween.

11. A method of countering load reaction forces in a rigid structure caused by a vertical load attributable to an elevator assembly suspended from said rigid structure, said method comprising providing a compression member; and positioning said compression member between points on said rigid structure from which said elevator assembly is suspended.

12. A method according to claim 11, wherein said compression member is positioned generally horizontally.

13. A method according to claim 11, wherein said compression member is positioned between bracket structures that attach elevator rope ends to said rigid structure.

ABSTRACT

A structural system for elevator assemblies includes a horizontal compression member positioned near the top of the elevator hoistway for reacting to inwardly directed tension loads and moment forces applied to the hoistway wall and connection components resulting from the elevator vertical load. The horizontal compression member includes a rigid member positioned in a compression state between mounting structures for elevator ropes and elevator machine components such that the compression member reacts and counters inwardly directed horizontal forces and resultant moment forces caused by a centralized, downward vertical load.

FIG. 1

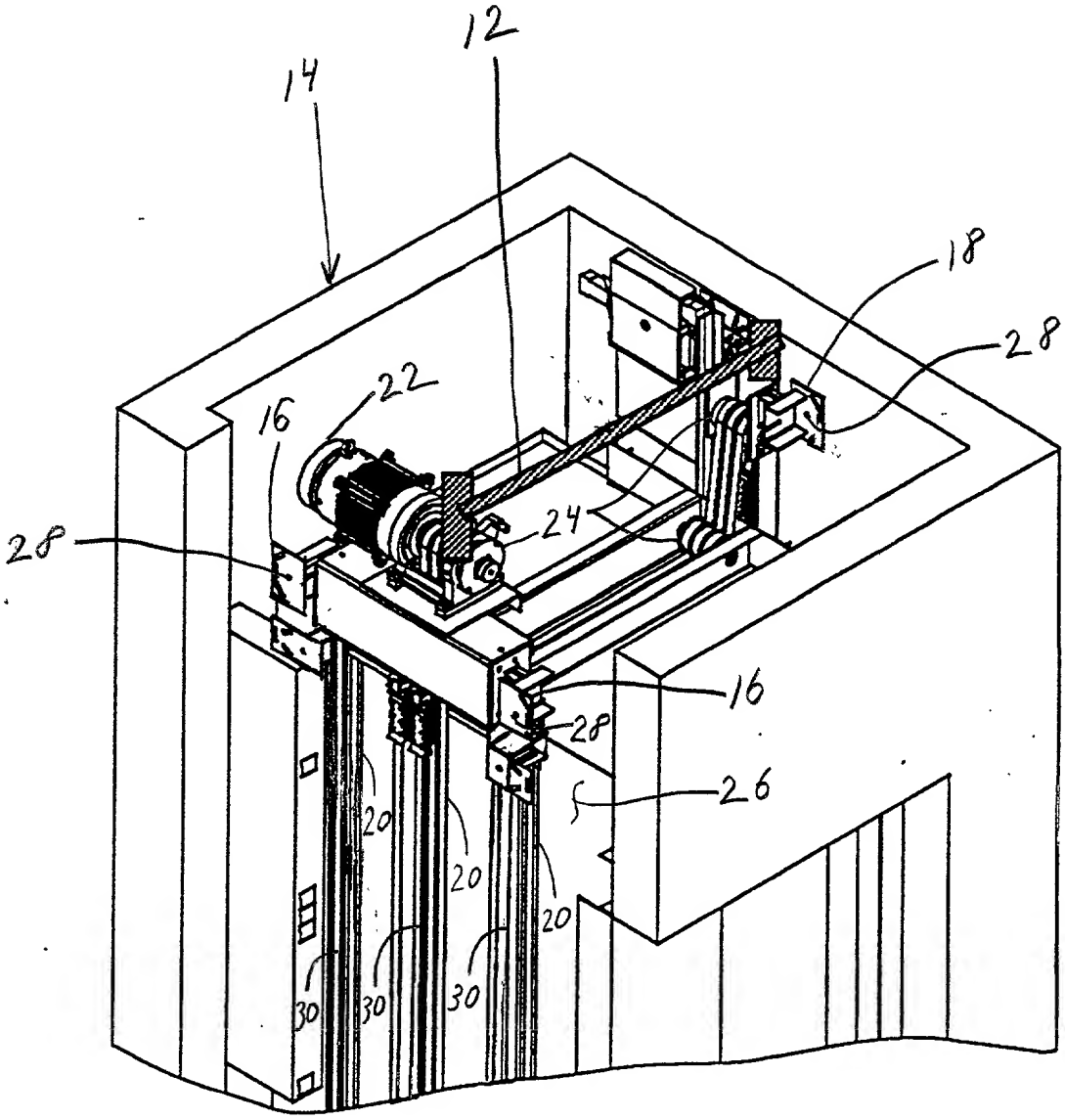
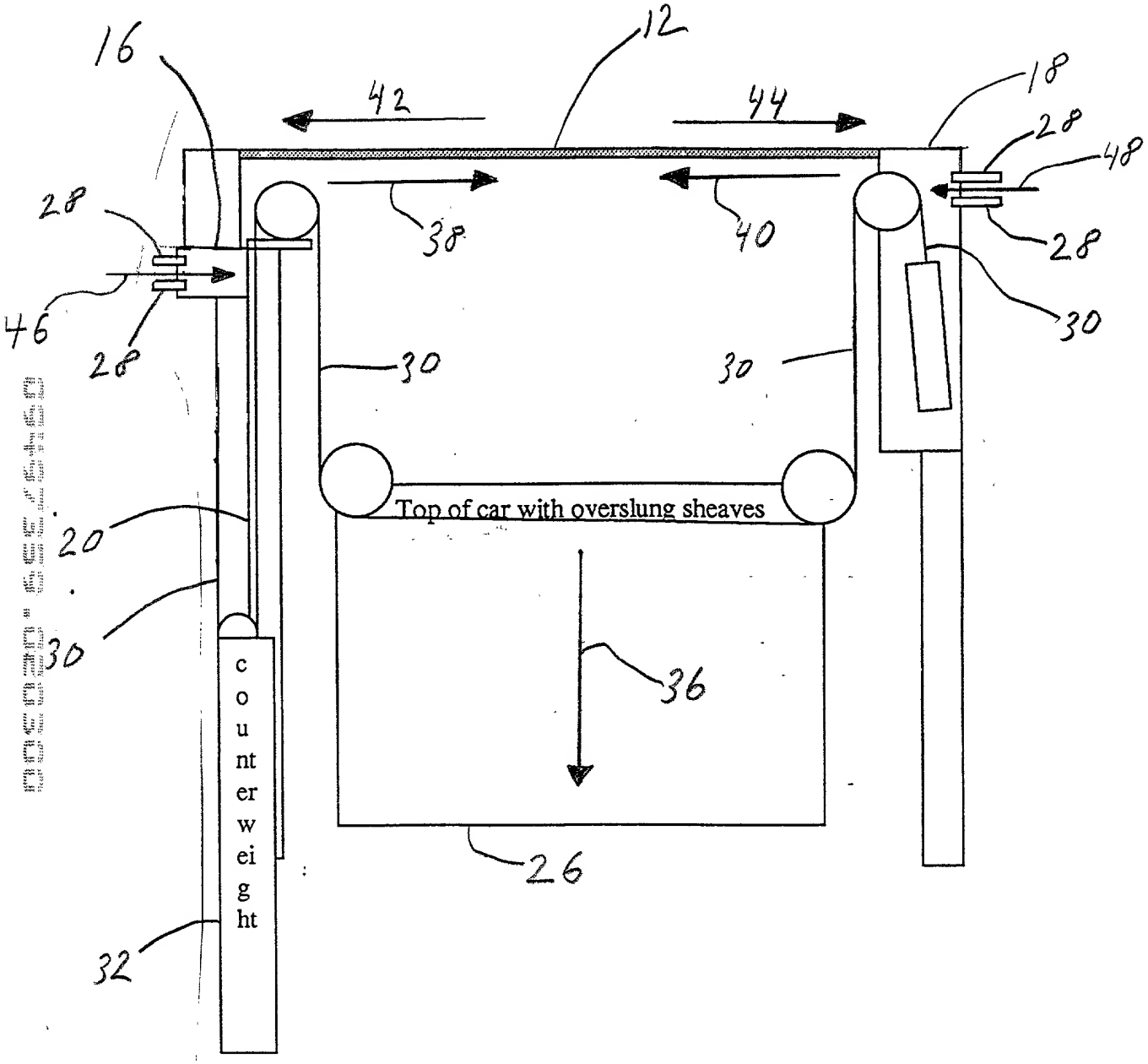


FIG 2


16
12
42
44
18
28
48
28
38
40
28
46
28
30
30
30
Top of car with overslung sheaves
20
30
36
counterweight
26
32

10

COMBINED DECLARATION AND POWER OF ATTORNEY IN ORIGINAL APPLICATION	DOCKET NO. OT-4538

I declare: that my residence and citizenship is as stated below next to my name; that I believe I am the original, first and sole inventor (if only I am named below) or joint inventor (if plural inventors are named below) of the subject matter which is claimed and for which a patent is sought in the specification entitled

ELEVATOR STRUCTURE MOUNTING SYSTEM HAVING HORIZONTAL MEMBER FOR REDUCING BUILDING LOADS AT TOP OF HOISTWAY

that I have reviewed and understand the contents of the above-identified specification, including the claims; that I acknowledge the duty to disclose to the Patent and Trademark Office all information known to me to be material to patentability as defined in 37 C.F.R. §1.56; that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

I appoint the following attorney(s) and/or agent(s) to prosecute this application and to transact all business in the Patent and Trademark Office connected therewith:

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